

"APPROVED FOR RELEASE: 07/16/2001

CIA-RDP86-00513R001755320017-0

APPROVED FOR RELEASE: 07/16/2001

CIA-RDP86-00513R001755320017-0"

PUTSEYKO, Ye.K.; TERENIN, A.N.

Effect of gases and vapors on the photoelectric processes in
zinc oxide and other semiconductors. Probl.kin.i kat. 8:53-60
'55. (MLRA 9:5)
(Photoelectricity) (Zinc oxide) (Semiconductors)

TERENIN

VOL'KENSHTeyN, F.F.; KURBATOV, L.N.; LYASHENKO, V.I.; KISELEV, A.V.
VOYEVODSKIY, V.V.; ROGINSKIY, S.Z.; ~~TERENIN, A.V.~~

Discussion. Probl.kin.1 knt. 8:68-76 '55.

(MLRA 9:5)

1. Institut fizicheskoy khimii AN SSSR (for Vol'kenshteyn, Kiselev, Roginskiy);
2. Voenno-morskaya meditsinskaya akademiya Leningrad (for Kurbatov);
3. Institut fiziki AN SSSR (for Lyashenko);
4. Institut khimicheskoy fiziki AN SSSR (for Voyevodskiy);
5. Leningradskiy gosudarstvennyy universitet (for Terenin).
(Photochemistry) (Desorption) (Semiconductors)

TERENIN, A. N.

AID P - 1566

Subject : USSR/Chemistry

Card 1/1 Pub. 119 - 1/5

Author : Terenin, A. N. (Leningrad)

Title : Molecular compounds and spectrum of the inter-molecular transfer of electrons

Periodical : Usp. khim., 24, no.2, 121-162, 1955

Abstract : An extensive review of the literature covering experimental data and theories on the formation of molecular compounds. Ultraviolet and visible band absorption studies were conducted on iodine complexes. 147 references (28 Russian: 1934-53)

Institution: None

Submitted : No date

TERENIN, A. N.

USER/ Physics - Chemistry

Card 1/1 Pub. 22 - 13/49

Authors : Kleinberg, A. V., and Terenin, A. N., Academician

Title : Gaseous nitric oxide fluorescence spectrum and the effect of foreign gases

Periodical : Dok. AN SSSR 101/3. 445-448, Mar 21, 1955

Abstract : A study of the dispersion of oscillating quanta of N O (nitric oxide gas) by the fluorescence spectrum method is described. The following gases: He, Ne, Ar, H₂, N₂, CO, CO₂, CH₄, C₂H₄, vapors of H₂O, C₂H₅OH, hexan and cyclohexane were tested to determine their effect on the fluorescence spectrum of N O. Given references: 2 USA, 1 German and 4 USSR (1950-1951). Illustrations; graphs; table.

Institution : The A. A. Zhdanov State University, Leningrad

Submitted : January 1, 1955

TERENIN, A. N.

USSR/ Physics - Photo-effect

Card 1/1 Pub. 22 - 16/52

Authors : Putseyko, Ye. K. and Terenin, A. N., Academician

Title : Effect of oxygen, water vapor and organic compounds on the photo-electronic processes in zinc oxide

Periodical : Dok. AN SSSR 101/4, 645-648, Apr 1, 1955

Abstract : The results of experiments conducted to determine the effect of oxygen, water vapor and organic compounds on the photo-electric processes in zinc oxide are described. Six references: 3 USSR, 2 USA and 1 Swiss (1927-1953). Graphs.

Institution :

Submitted : January 15, 1955

TERENIN A. N.

USSR/Physics - Fluorescence

Card 1/1 Pub. 22 - 14/47

Authors : Kleyenberg, A. V., and Terenin, A. N., Academician

Title : Scattering of oscillating quanta and extinguishing of the nitric oxide (NO) fluorescence

Periodical : Dok. AN SSSR 101/6, 1031 - 1034, Apr. 21, 1955

Abstract : Experiments with NO (nitric oxide) are described. The experiments were conducted to study the process of extinguishing NO fluorescence by strange gases. The probability of extinguishing NO fluorescence was determined. The capability of molecules of various gases to scatter the oscillating quanta of NO was investigated. The photographic photometric method was used in the experiments. Twelve references 2 USSR, 1 Brit., 3 Germ. and 6 USA (1933-1955). Graphs; table.

Institution : A. A. Zhdanov State University, Leningrad.

Submitted : February 3, 1955

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TERENIN, A., PUTSEYKO, Ye. and AKOMOV, I.

"Optical Sensitization of the Halides of Silver, Thallium, and Other Semi-Conductors by Dyestuffs," a paper given at the International Conference on Scientific Photography, 24-27 Sep 56, Cologne.

E-3072367

TERENIN, A. N. and SHLOBOV, A. N.

"Infrared Spectra of Phthalocyanines With Different Central Metal Atoms", a paper presented at the Sixth International Spectroscopical Colloquium, Amsterdam, 14-19 May 1956. (Academy of Sciences of the USSR).

Translation-D5 6016

TERMIN, A. H. and GIDOROV, A. N.

"Le Spectre Infrarouge des Phthalocyanines." *Ann International Colloquium on Spectroscopy*, 14-19 May 1966.

⁽⁴⁾
TECHNIK, A., PUYANIKO, B., and MILIN, I.

"Optical sensitisation of the halides of silver, thallium, and other semi-conductors by dyestuffs," a paper submitted at the International Conference of Scientific Photography, Cologne, FRG, 24-27 Sep 56.

VAVILOV, S.I.; LEBEDEV, A.A., akademik; TOPCHIEV, A.V., akademik; ~~TERENIN~~,
A.N., akademik; LANDSBERG, G.S., akademik; VUL, B.M.; KRAVETS, T.P.
[deceased]; LEVSHIN, V.L.; PROFILOV, P.P.; GALANIN, M.D.; KUZNETSOV,
I.V.; VAVILOV, V.S.; GUROV, K.P., redaktor izdatel'stva; KISELEVA,
ALAL, tekhnicheskii redaktor

[Collected works] Sobranie sochinenii. Moskva, Izd-vo Akademii nauk
SSSR. Vol.4. [Experimental foundation of the theory of relativity.
On "warm" and "cold" light. The eye and the sun. Popular scientific
articles and reviews] Eksperimental'nye osnovaniia teorii otnositel'-
nosti, O "teplom" i "kholodnom" svete, Glaz i solntse, Nauchno-
populiarnye i obzornye stat'i. 1956. 469 p. (MLRA 9:8)

1. Chlen-korrespondent AN SSSR (for Vul, Kravets)
(Physics)

LEBEDEV, A.A.; TERENIN, A.N.; ARZHANIKOV, N.S.; BOGORODITSKIY, N.P.;
YERMOLIN, N.P.; ODINTSOV, G.V.; SOKOLOV, S.Ya.

Professor B.P. Kozyrev. Elektrichestvo no.1:94 Ja '56. (MLRA 9:3)
(Kozyrev, Boris Pavlovich)

Terenin, A.N.

USSR/Photochemistry. Radiation Chemistry. Theory of Photographic Process. B-10

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26261

Author : A.N. Terenin, A.V. Karyakin, Ye.B. Lyubomudrov, O.D. Dmitriyevskiy, P.E. Sushinskiy

Title : Alterations of Spectra of Phthalocyanins in Solutions under Action of Powerful Light Impulses.

Orig Pub : Optika i spektroskopiya, 1956, 1, No 4, 456-462

Abstract : Solutions of phthalocyanins (Ph) of Mg, Zn, Fe, Cu and Co in alcohol, acetone, ether, pyridine and toluene (10^{-4} to 10^{-5} M) were liberated of O_2 by vacuum treatment and illuminated with an impulse bulb ISS-250 (flash energy 250 joules, flash duration 10^{-3} to 10^{-4} sec.). The spectra in the range of 0.5 to 0.9μ were photographed with a spectrograph ISP-51. Either the impulse bulb itself, or another impulse bulb lighted by a time relay switch 2×10^{-5} to 2.1 sec. after the flash of the first bulb served as the light source. PhMg and PhZn are subject to a short-duration (from 0.8 to 1×10^{-3} sec. in case of PhMg) discoloration under the action of a flash. The discoloration of PhMg and PhZn is completely eliminated by letting

Card : 1/2

USSR/Photochemistry. Radiation Chemistry. Theory of Photographic Process. B-10

Abs Jour : Ref Zhur - Khimiya, No 8, 1957, 26261

O₂ into the solution; no discoloration of solutions of PhFe, PhCu and PhCo is observed; solutions of PhMg and PhZn are fluorescent. The surmise is expressed that the short-duration discoloration is the result of the molecule transition into the metastable (triplet) state.

Card : 2/2

TRENTIN, N

12/40

12/40

Terenin, A. N.
USSR/Physical Chemistry - Kinetics. Combustion. Explosives. Topochemistry.
Catalysis, B-9

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 412

Author: Vasil'yev, R. F., Terenin, A. N., and Emanuel, N. M.

Institution: Academy of Sciences USSR

Title: Spectroscopic Investigation of the Intermediate Product and the Transition Step in the Oxidation of Acetaldehyde by Acetyl Hydroperoxide

Original

Periodical: Izv. AN SSSR, section on chemical sciences, 1956, No 4, 397-402

Abstract: The intermediate peroxide product (I) formed during the reaction of CH_3COOOH (II) with CH_3CHO (III) (see preceding abstract) has been crystallized from toluene solution at -50° and dissolved in nitromethane. The solution was placed in a cuvette with polyethylene windows, and its spectrum recorded with an IR spectrophotometer. In the spectrum the average intensity band 847 cm^{-1} , produced by the valency oscillations of the -O-O- group, was found. From the 847 band and the 586 (II) and 947 cm^{-1} (III) bands in the temperature range

Card 1/2

US: Physical Chemistry - Kinetics. Combustion. Explosives. Topochemistry.
Catalysis, B-9

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 412

Abstract: -20 to 20°, the kinetics for the establishment of the equilibrium $II + III \rightleftharpoons I$ were studied qualitatively as well as the kinetics for the formation of acetic acid. The small shift in the 847 band of I relative to the II band (856 cm^{-1}) indicates that I apparently has a hydroperoxide structure, e.g., $\text{CH}_3\text{CH}(\text{OOH})\text{OC}(\text{O})-\text{CH}_3$.

Card 2/2

enin, A. N.

USSR/Physical Chemistry - Kinetics. Combustion. Explosives. Topochemistry.
Catalysis, B-9

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 413

Author: Vasil'yev, R. F., Terenin, A. N., and Emanuel, N. M.

Institution: Academy of Sciences USSR

Title: The Effect of the Solvent on the Rate of Oxidation of Acetaldehyde
by Acetyl Hydroperoxide from the Point of View of Hydrogen-Bonding

Original

Periodical: Izv. AN SSSR, section on chemical sciences, 1956, No 4, 403-407

Abstract: The rate for the first step of the reaction (see preceding abstract) at 24.2° is the same in CHCl_3 , $\text{C}_6\text{H}_5\text{CH}_3$, C_6H_6 , and $\text{C}_6\text{H}_5\text{-NO}_2$; the rate is somewhat higher in CCl_4 and considerably lower in CH_3OH , CH_3NO_2 and CH_3COCH_3 . In the IR absorption spectra of CH_3COOOH solutions in CH_3NO_2 and CH_3COCH_3 there are observed, in addition to the bands due to intermolecular hydrogen bonding in CH_3COOOH ($3,310\text{ cm}^{-1}$), broad bands with maxima at $3,385$ and $3,285\text{ cm}^{-1}$, which are ascribed to intramolecular hydrogen bonding (MVC [mezmolekulyarnyy vodorodniy svyazi])

Card 1/2

USSR/Physical Chemistry - Kinetics. Combustion. Explosives. Topochemistry.
Catalysis, B-9

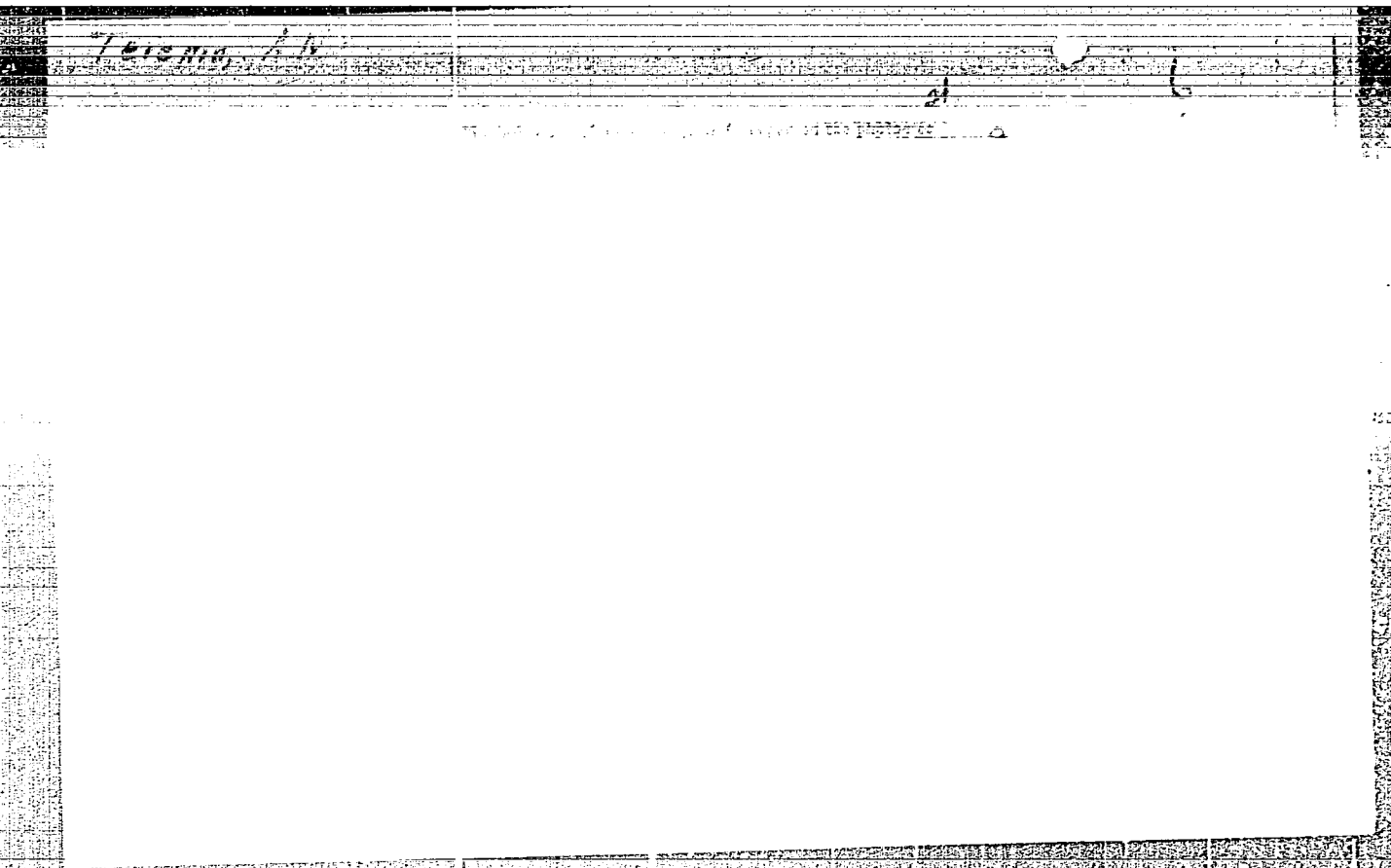
Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 413

Abstract: between the solvent and CH_3COOOH . In the spectrum of the solution of CH_3COOOH in $\text{C}_6\text{H}_5\text{NO}_2$ there are observed only the $3,310\text{ cm}^{-1}$ bands: MVC is either absent or very weak. At the same time it can be assumed that MVC takes place in the system $\text{CH}_3\text{COOOH} + \text{CH}_3\text{OH}$. In the remaining solutions MVC is not possible. The authors are of the opinion that the inhibition of the reaction observed in a number of solvents is due to the hindering effect of the molecules which are joined to the CH_3COOOH by hydrogen bonds.

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TERENIN, A.N.; YERMOLAYEV, V.L.

Intermolecular transfer of energy occurring in sensitized luminescence.
Izv. AN SSSR. Ser. fiz. 20 no. 4:382 Ap '56. (MIRA 10:1)
(Luminescence) (Fluorescence)

POTSHEYKO, Ye.K.; TEREHIN, A.N.

Effect of vapors and gases on the internal photoeffect of phthalocyanines
containing different metals [with English summary in insert]. Zhur.fiz.
khim.30 no.5:1019-1027 My '56. (MLBA 9:9)
(Photoelectricity) (Phthalocyanine)

USSR/Physics - Luminescence

Card 1/1 Pub. 118 - 2/7

Authors : Terenin, A. N., and Yermolayev, V. L.

Title : Intermolecular transfer of energy in the phenomenon of sensitized luminescence of organic systems (part II)

Periodical : Usp. Fiz. nauk, 58/1, 37-68, Jan 1956

Abstract : The intermolecular transfer of energy observed in the phenomenon known as the sensitization of luminescence of organic systems is discussed. Two types of energy transfer are considered: kinetic and inductive. Various cases are analyzed in which sensitized luminescence and the energy transfer were observed. Fifty-seven references: 8 Germ., 21 USA, 28 USSR (1927-1955). Graphs; diagrams.

Institution :

Submitted :

Terenin, A N

K-6

USSR/Optics - Spectroscopy

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 13043

Author : Filimonov, V.N., Terenin, A.N.

Inst : Leningrad State University, USSR.

Title : Infrared Spectra of Absorption of Complexes of Several Organic Compounds with Aluminum Bromide and Tin Tetrachloride.

Orig Pub : Dokl. AN SSSR, 1956, 109, No 4, 799-801

Abstract : An investigation was made of the variation of the infrared spectra of absorption of certain organic compounds, occurring when AlBr_3 and SnCl_4 are dissolved in them. The frequency of the valent vibration of $\text{C}=\text{O}$ acetone is reduced by 165 cm^{-1} . The structure of the overtone band $\text{C}-\text{H}$ of diethyl-ether experiences changes analogous to the changes in it upon interaction of the ether

Card 1/2

USSR/Optics - Spectroscopy

K-6

Abs Jour : Ref Zhur - Fizika, No 5, 1957, 13043

with protonic acids. Interaction with SnCl_4 reduces the frequency of the overtone of the vibrations of O-H methanol by 170 cm^{-1} and increases the frequency of the overtone of C-H by 70 cm^{-1} relative to the frequency of the monomer molecules of methanol in CCl_4 . Changes in the frequency are explained by the formation of donor-acceptor bond between the molecules of the halogenides of metals and the oxygen atoms of the organic compounds.

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TERENIN, A. H.

"Photosynthesis in the Shortest Ultraviolet," a paper presented at the International Symposium on the Origin of Life on the Earth, Aug 57, Moscow.

TERENTIEV, A., Institute Physics, Leningrad State University USSR

"Influence des hautes pressions gazeuses sur les bandes d'absorption du chloroforme dans l'infrarouge photographique," (The effect of high pressure on the absorption bands of chloroform in the photographic infrared) a paper submitted at the Colloquium on the optical and Acoustical Properties of Compressed Fluids and Intermolecular Forces, Bellevue, France, 1-6 Jul 57.

B-3,087,136, 6 Sep 57.

TERENIN, A.N., akademik; FAYIBOYM, I.B., redaktor; GUBIN, M.I., tekhnicheskii
redaktor.

[Transformation of light energy] Prevrashcheniia energii sveta. Izd.
2-oe, perer. Moskva, Izd-vo "Znanie," 1957. 20 p. (Vsesoiuznoe
obshchestvo po rasprostraneniui politicheskikh i nauchnykh znani.
Ser. 8, no.12) (MLRA 10:4)
(Light)

TERENIN, A.,^[N.] and FILIMONOV, V., Leningrad.

"Hydrogen Bond Between Adsorbed Molecules and Structural Oh-Groups At The Surface of Solids," report submitted at IUPAP Symposium on Nature of Hydrogen Bonding, Ljubljana, Yugoslavakis, 30 July - 3 Aug 57.

also in Vestnik AN SSSR, 1957, v. 27, No. 11, pp. 137-39, "An Intl. Symposium on the Hydrogen Bond in Ljubljana," by Vol'kenshteyn, M.V.

Trans. Encl. B-3,096,177, 20 Jan 58.

TERENIN, A.

"Infrared Spectra of Addition Compounds with Metal Halides,"
a paper submitted at the International Meeting of European Molecular
Spectroscopists, Freiburg, Breisgau, West Germany. *July 9, 1957*

The paper was read by P. F. Sphoragin.

TERENIN, A. N.

AUTHORS: Tagantsev, K.V. and Terenin, A.N.

51-3-11/24

TITLE: Effect of adsorption of gases on luminescence of zinc oxide. (Vliyanie adsorbtsii gazov na lyuminestsentsiyu okisi tsinka).

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy), 1957, Vol.2, No.3, pp. 355-360 (U.S.S.R.)

ABSTRACT: Continuation of the work of A. N. Terenin, V. Gachkovskiy and K. Ya. Kasparov (Izvestiya Akad. Nauk SSSR., O.M.E.N. (ser.khim.), p.805, 1936; Acta Physicochimica U.R.S.S., Vol.4, p.521, 1937; Doklady Akad. Nauk SSSR, Vol.28, p.515, 1940) on quenching of luminescence of solids by gases and vapours. ZnO was deposited on glass or metal plates and heated in vacuo to 200 or 400 C. It was excited by a mercury lamp. A uranium-glass plate served as a luminescent standard. A differential photometer was used to measure the difference between the emissions of ZnO and of the uranium glass. The emission intensity was measured using (a) short exciting light pulses of 10 seconds with at least 5 minute dark intervals and (b) continuous excitation. Pulse measurements showed that adsorption of oxygen, ozone (produced by electrodeless discharges), water vapour and quinone vapour on ZnO, which was vacuum dried, produces

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Effect of adsorption of gases on luminescence of zinc oxide.
(Cont.) 51-3-11/24

quenching of luminescence at adsorbed gas or vapour pressures from 0.1 mm Hg upwards. Continuous excitation increased the emission intensity of the quenched samples as long as the excitation was applied. When the continuous excitation ceased the emission fell to the original quenched value. This effect was ascribed to photodesorption of the adsorbed molecules. An energy level scheme for ZnO is given. This has two local levels in the energy gap: an upper one with excess Zn atoms (dark conductivity centres) and a lower one with Zn⁺ ions (photoconductivity and luminescent centres). Adsorption of O₂, O₃, O, H₂O and quinone produces a double layer and more electron trapping levels at the ZnO surface. The results are interpreted in terms of the above energy scheme.

Card 2/2 There are 9 figures and 13 references, 11 of which are Slavic.

SUBMITTED: October 6, 1956.

ASSOCIATION: Physical Research Institute, Leningrad State University.
(Nauchno-Issledovatel'skiy Fizicheskiy Institut,
Leningradskogo Gosudarstvennogo Universiteta).

AVAILABLE:

51-5-6/11

TERENIN, A.N.

AUTHORS: Fillimonov, V.N., Bystrov, D.S. and Terenin, A.N.

TITLE: Infra-red Spectra of Molecular Compounds with Metal Halides
(Infra-krasnye spektry molekulyarnykh soyedineniy s galogeni-
dami metallov)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr 5,
pp.480-493 (USSR).

ABSTRACT: Infra-red absorption spectra of molecular compounds, NO, acetonitrile, pyridine, cyclohexane, acetone and methanol with AlBr_3 , AlCl_3 and SnCl_4 were investigated in the region 8000 to 700 cm^{-1} . The work was carried out on an infra-red spectrometer of type MKC-11 with prisms of LiF and NaCl and an autocollimating spectral instrument of high dispersion using glass prisms. Pronounced changes in the spectra of molecules to which metallic halogens (AlBr_3 , AlCl_3 and SnCl_4) become attached, show that a donor-acceptor bond is established between them. The frequency changes are quite pronounced and form a direct evidence supporting the above hypothesis. Detailed absorption curves of the substances and frequency

Card 1/2

51-5-6/11

Infra-red Spectra of Molecular Compounds with Metal Halides.
tables are given. There are 10 figures, 8 tables and 29
references, many of which are Slavic.

ASSOCIATION: Scientific and Research Institute of Physics of the Leningrad
State University (Nauchno-issledovatel'skiy fizicheskiy
institut, Leningradskogo gosudarstvennogo universiteta)

SUBMITTED: May 17, 1957.

AVAILABLE: Library of Congress.

Card 2/2

TERENIN A N.

62-11-29/29

AUTHOR: None Given.

TITLE: General Meeting of the Department for Chemical Sciences of the AN USSR Held in May 30-31, and June 28, 1957 (Obshchiye sobraniya Otdeleniya khimicheskikh nauk Akademii nauk SSSR 30-31 maya i 28 iyunya 1957 g).

PERIODICAL: Izvestiya AN SSSR, Otdel. Khim. Nauk, 1957, Nr 11, pp. 1416-1419 (USSR)

ABSTRACT: Chairman: Member of the Academy A. P. Vinogradov.
Lectures: A. N. Terenin, Member of the Academy.
"Spectroscopy of the Molecular Compounds with Metal Halides."
V. N. Filimonov, the student D. Borzovyy and Sh. Sh. Raskin helped the author in his work.
S. Z. Roginskiy, corresponding Member of the Academy,
B. V. Nekrasov, corresponding Member of the Academy,
N. D. Sokolov, Doctor of chemical sciences, M. M. Shemvakin, corresponding Member of the Academy, A. I. Kitaygorodskiy, Doctor of physico-mathematical sciences, A. P. Vinogradov, Member of the Academy, took part in the discussion.
B. F. Nikol'skiy, corresponding Member of the Academy of

Card 1/3

General Meeting of the Department for Chemical Sciences of the AN USSR Held in May 30-31 and June, 28, 1957 62-11-29/29

the AN SSSR (partaking authors M. M. Shul'ts and N. P. Isakova) spoke on "Influence of the Composition of Boro-Aluminum-Silicate Glasses on their Electrode - and Acid-Properties." V. A. Kargin, Member of the Academy and N. I. Nikitin, corresponding Member of the Academy, took part in the discussion. Ya. I. Ryskin (from the institute for silicate-chemistry of the AN SSSR) spoke on "Hydrogen-Bond in Silican Compounds According to Data of the Infrared Spectrometry." M. A. Poray-Koshits, and A. D. Petrov, corresponding member of the Academy took part in the discussion. A. I. Kitaygorodskiy, Doctor of physico-mathematical sciences spoke on "Conditions for the Formation of Solid Solutions of Organic Compounds." B. V. Nekrasov, corresponding Member of the Academy, Ye. S. Makarov, Doctor of chemical sciences, V. G. Kuznetsov, and S. Z. Boginskiy, corresponding Member of the Academy of the AN USSR took part in the discussion. M. M. Koton, Doctor of chemical sciences (partaking author Yu. V. Mitin) spoke on "The Synthesis of Polymers with Cycles in the Chain."

Card 2/3

General Meeting of the Department for Chemical Sciences
of the AN USSR Held in May 30-31 and June, 28, 1957

62-11-29/29

June 28, 1957: Chairman: N. N. Semenov, Member of the Academy, Kargin, Valentin Alekseyevich, Member of the Academy spoke on "The Structure and Phase-Condition of Polymers."

G. L. Slonimskiy (partaking authors T. I. Sogolova and V. A. Kargin) spoke on "The Particularities of Flow in Polymers."

N. V. Mikhaylov, Doctor of chemical sciences (partaking authors V. I. Mayboroda and V. A. Kargin) spoke on "The New Production Methods for Viscous Tibers". V. I. Sharkov, Professor, S. Z. Roginsky, corresponding Member of the Academy, V. I. Ivanov, Doctor of chemical sciences took part in the discussion. Welcome speeches were held by N. N. Semenov, Member of the Academy, D. P. Novikov, Minister-Representative for chemical industry, V. I. Veselovskiy, Professor, Ya. I. Geragimov, corresponding Member of the Academy, P. A. Rebinder, Member of the Academy and Ye. O. Kuvshinskiy, Professor.

AVAILABLE: Library of Congress

Card 3/3

Terenin, A. N.

48-4-16/48

SUBJECT: USSR/Luminescence

AUTHORS: Tagantsev K. V. and Terenin A. N.

TITLE: Effect of Gas Adsorption on Zinc Oxide Luminescence (Vliyaniye adsorbtsii gazov na lyuminesentsiyu okisi tsinka)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, pp 525-527 (USSR)

ABSTRACT: Dry oxygen has a quenching effect on the luminescence of zinc oxide trained at 200°C under vacuum. Water vapor also causes quenching. Oxygen and water vapor combined have a strong quenching effect. The quenching intensity depends on duration of illumination. When illumination lasted long, the luminescence after being quenched arises again. Oxygen subjected to the action of electric discharges causes strong quenching. The luminescence, once quenched, arises again at continuous illumination. Low-pressure quinone vapors also quench the luminescence of zinc oxide, which appears again at continuous illumination.

Card 1/2

These phenomena can be interpreted from the viewpoint of electron capture by negatively-charged adsorbed molecules.

TITLE:

Effect of Gas Adsorption on Zinc Oxide Luminescence (Vliyaniye
adsorbtsii gazov na lyuminesentsiyu okisi tsinka) ^{48-4-16/48}

In a discussion that followed this report A. Krasnovskiy added that acidification of water intensifies its quenching abilities, and reduction in pH toward alkalinity decreases the quenching effect.

No references are cited.

INSTITUTION: Leningrad State University im. Zhdanov

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

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CIA-RDP86-00513R001755320017-0"

TERENIN A.N.

48-5-21/56

SUBJECT: USSR/Luminescence

AUTHORS: Pershina Ye.V. and Terenin A.N.

TITLE: On Luminescence of Microporous Glass Activated by Salts of Heavy Metals (O lyuminestsentsii mikroporistogo stekla, aktivirovannogo solyami tyazhelykh metallov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #5, p 681 (USSR)

ABSTRACT: One can obtain phosphors with phosphorescence lasting a few minutes by introducing Zn-, Cd- and Pb-salts out of hydro- and ammonium-solutions into microporous sodium-boron-silicon glass and calcinating it in the air at a temperature of 500°C. The optimum salt concentration depends on its solubility and ability to be adsorbed by the microporous glass.

The luminescence spectrum consists of a broad band in the visual region of the spectrum with main peaks at about 460 and 540 mμ with small variations of relative intensities dependent on the kind of salt.

Card 1/2

The intensity of luminescence and afterglow are very sensitive

48-5-21/56

TITLE:

On Luminescence of Microporous Glass Activated by Salts of Heavy Metals (O lyuminestsentsii mikroporistogo stekla, aktivirocannogo solyami tyazhelykh metallov)
to changes in the structure of the surface of microporous glass.

The luminescence observed is apparently caused by surface centers of the distorted structure of the glass.

One Russian reference is cited.

INSTITUTION: Physical Department of the Leningrad State University
im. Zhdanov

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress

Card 2/2

20-114-4-20/63

AUTHORS: Dmitriyevskiy, O. D., Yermolayev, V. L.
Terenin, A. N., Member of the Academy

TITLE: Direct Measurement of the Life of Excited Molecules of Chlorophyll and Analogous Pigments in Different Media (Pryamyye izmereniya vremeni zhizni возбужденных молекул хлорофилла и аналогичных пигментов в различных средах)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 4, pp. 751-753 (USSR)

ABSTRACT: In order to determine this life the authors measured the duration of fluorescence by means of the phase fluorimeter by A. M. Bonch-Bruyevich et al. whose resolving power in time is 2.10^{-11} sec. Other devices used in these investigations and the errors of measurement are also shortly discussed. Fluorescence was excited by the mercury line 436 mμ. Observation was effected through the light filter KC-10 with a thickness of 4 mm. The concentration of the solutions always remained below 10^{-5} mol/l. The values obtained for the solutions of chlorophyll and related pigments in various solvents at +20°C are summarized in a table. The here measured life of the excited singlet state of chlorophyll markedly differs from those values which were obtained by indirect methods from the polarization

Card 1/2

Direct Measurement of the Life of Excited Molecules of Chlorophyll and Analogous Pigments in Different Media 2c 114-4-20/63

of the fluorescence and from the integral of the absorption band. The decay time of the fluorescence of the pigments depends only little on the solvent. For chlorophyll by it is approximately twice as small as for chlorophyll a, which is connected with the different quantitative yield of fluorescence. In phthalocyanides life is somewhat longer than in pheophytines of the corresponding metals. Hematoporphirin has the longest decay time. If a Zn-atom is introduced into the pigment instead of a Mg-atom, the decay time of the fluorescence is reduced to about half of its former length. A table contains the here obtained data on the decay time of the fluorescence of chlorophyll in natural media. The values thus obtained are about 3-8 times as short as in molecular solutions. In the living leaf τ depends on the intensity of exposure to light. The reduction of τ and the reduction of fluorescence yield in the living leaf are largely due to the high concentration of pigments under these conditions. There are 2 tables and 6 references, 1 of which is Soviet.

SUBMITTED:

May 31, 1957

Card 2/2

AUTHORS

TITLE

PERIODICAL

ABSTRACT

CARD 1/3

TERENIN, A.N. 20-4-31/60
Vilesov, F.I. and Terenin, A.N., Academician.

The Photoionization of the Vapors of Some Organic Compounds.
(Fotoionizatsiya parov nekotorykh organicheskikh soyedineniy.)

Doklady Akademii Nauk SSSR, 1957, Vol. 115, Nr 4, pp. 744-746 (USSR)

For works on the electronics of aromatic compounds performed in this (see association!) and in a neighboring laboratory it was necessary to determine the values of the separation energy of electrons in a gaseous state. Photoelectric methods were employed for measuring the ionization potentials of the organic vapors:

- 1) the condenser method (Watanabe),
- 2) method of the ionization chamber with a gas amplification,
- 3) the Geiger counter method.

The method 2) was for the first time used by the authors for this purpose. The Geiger counter method was not employed since 1951, since its results are in bad agreement with those of the condenser method. But the authors constructed a special counter model. This method

20-4-31/60

The Photoionization of the Vapors of Some Organic Compounds.

is the most sensitive, since it makes it possible to record every ionization act. A hydrogen high-voltage lamp served as source. The photoionization and transmission spectra were recorded on an automatic recorder type EPP-09. Benzene, toluol and p-xylol were investigated by all three methods. It was found that all three methods yield values of the ionization potentials which lie within the experimental error. For measuring the not easily volatile substances (quinone, phenylhydrazine, phenol etc.) the Geiger counter method was employed. Fig. 1 gives several dependence curves of the ionization flow on the wave length of the acting reaction. From this it may be seen that the quantum yield of the photoionization for aromatic amines near the ionization threshold is considerably smaller than for other compounds. According to the Franke-Kondon principle this must point to the fact that the inter-nuclear distances in the molecules in the corresponding ions vary considerably as regards quantity. The first photoionization potentials obtained by the authors are given in table 1. Figure 2 shows the dependence of the ionization potential of benzene derivatives (curve 1) and of aniline

CARD 2/3

The Photoionization of the Vapors of Some Organic Compounds.

20-4-31/60

(curve 2) on the number of hydrogen atoms which are replaced by the group $--CH_3$. The reduction of these potentials with an increase in the number of replaced hydrogen atoms is connected with the increasing density of the cloud of electrons in the benzene ring. There are 2 figures, 1 table, 3 Slavic references.

ASSOCIATION:

Leningrad State University imeni A.A. Zhdanov.
(Leningradskiy gosudarstvennyy universitet imeni
A.A. Zhdanova)

SUBMITTED:

July 26, 1957

AVAILABLE:

Library of Congress.

CARD 3/3

TERENIN, A. N. ~~XXXXXX~~ (Acad. Sci. USSR)

"Infrared Spectra of Molecule Adsorbed on Solid Surfaces," p. 2.
report to be presented at 1958 Gordon Conference on Infrared Spectroscopy, 18-22
Aug 1958, Kimball Union Acad., Meridian, New Hampshire.

TERENIN, A.^N and PUTZEYKO, A.
Institut de Physique, Leningrad, U.R.S.S.).

"Sensibilisation Optique Des Semi-Conductors Par La Chlorophylle Et Pigments
Apparentes,"

paper submitted at 8th Annual Meeting of French Society of Physical Chemistry,
Paris, 27-30 May 1958.

TERENIN, A. and YERMOLAYEV, V.
Institut de Physiques, Leningrad, U.R.S.S.

"Transfert D'energie Entre Niveaux De Triplets,"

paper submitted at 8th Annual Meeting of French Society of Physical Chemistry,
Paris, 27-30 May 1958.

TERENIN, A. ^{N.} and VILESOV, P. (Leningrad)

"Photoelectronic Emission of the Surface of Semi-Conductor Catalysts,"
(Section A)

report submitted for Annual Meeting East German Chemical Society, 28 Oct -
1 Nov 1958, Leipzig, G.D.R.

TERENIN, A.N.

Nature of elementary photoreactions in chlorophyll [with summary
in English]. Biofizika 3 no.3:377-381 '58 (MIRA 11:6)

1. Institut biokhimii im. A.N. Bakha AN SSSR, Moskva.
(CHLOROPHYLL)
(PLANTS, EFFECT OF LIGHT ON)

51-4-3-7/30
AUTHORS: Royev, L.M., Filimonov, V.N. and Terenin, A.N.
TITLE: Changes in the Infrared Spectrum of Molecules on Interaction with Adsorption Centres of an Aluminium Silicate Catalyst. (Izmeneniya infrakrasnogo spektra molekul pri ikh vzaimodeystvii s tsentrami adsorbtsii al'yumosilikatnogo katalizatora.)
PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.3, pp.328-334 (USSR)
ABSTRACT: The present paper forms part of a cycle of investigations on application of the infrared spectra to the study of adsorption and catalysis which was started in 1940 (Ref.1). The present paper reports measurements of the infrared absorption spectra of ammonia and acetonitrile adsorbed on an aluminium silicate catalyst and on silica gel. The aluminium silicate catalyst contained about 10% of Al_2O_3 and had a specific surface area of 400 m^2/g . The specific surface area for silica gel was about 500 m^2/g . Both adsorbents were in the form of powders placed between two plates of LiF or NaCl. Thickness of an adsorbent layer was about 10 mg/cm^2 . In some tests

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51-4-3-7/30

Changes in the Infrared Spectrum of Molecules on Interaction with
Adsorption Centres of an Aluminium Silicate Catalyst.

porous glass plates, 0.5 mm thick, were used. These glass plates had a specific surface area of 100 m²/g. Before measurements the adsorbents were heated for 2 hours in air at 600°C and for 1 1/2 hours in 10⁻⁴ mm Hg vacuum at 450°C. Adsorption of ammonia and acetonitrile vapours and recording of spectra were carried out using a vacuum cell described in Ref.9. Infrared spectrometers IKS-2 and IKS-11 with LiF and NaCl prisms were used. Fig.1 gives the absorption band of OH groups on the surfaces of the aluminium silicate catalyst (curve 1) and silica gel (2) after vacuum treatment and before adsorption of the vapours studied (both adsorbents were immersed in CCl₄). Fig.2 gives the absorption spectra of the aluminium silicate catalyst (curve 1) and silica gel (2) with ammonia adsorbed on them and after immersion in CCl₄. Fig.3 gives the change in the absorption spectra of the aluminium silicate catalyst on adsorption of acetonitrile: curve 1 represents the vacuum-dried adsorbent, curve 2 shows the adsorbent with acetonitrile, curve 3 shows the same adsorbent as in

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51.4 -3-7/30

Changes in the Infrared Spectrum of Molecules on Interaction with Adsorption Centres of an Aluminium Silicate Catalyst.

curve 2 after evacuation of acetonitrile. Fig.4 gives the change in the absorption spectra of porous glass on adsorption of acetonitrile; curve 1 represents the adsorbent by itself, curve 2 represents the adsorbent with acetonitrile, curve 3 represents the adsorbent of curve 2 after evacuation of acetonitrile. The results obtained show a lowering of the frequencies of the valence vibrations of $N-H$ of ammonia and an increase of the frequency of $C\equiv N$ of acetonitrile on adsorption. These changes in frequencies are greater in the case of adsorption on the aluminium silicate catalyst than on adsorption on silica gel. Change of the frequencies of ammonia and acetonitrile on adsorption on the aluminium silicate catalyst are similar in their sign to the changes of frequencies of the same molecules when the latter are attached to a non-protonic catalyst (such as $AlCl_3$). Adsorption of molecules on carefully vacuum-treated samples of the aluminium silicate catalyst is not accompanied by attachment of the catalyst protons to the adsorbed molecules. The authors thank A.N. Sidorov for help in this work.

Card 3/4

51-4-3-7/30
Changes in the Infrared Spectrum of Molecules in Interaction with
Adsorption Centres of an Aluminum Silicate Catalyst.

There are 4 figures, 1 table and 18 references, of which
9 are Soviet, 5 American, 1 German, 1 French, 1 English
and one translation of a Western work into Russian.

ASSOCIATION: Physics Research Institute, Leningrad State University.
(Nauchno-issledovatel'skiy fizicheskiy institut
Leningradskogo gosudarstvennogo universiteta.)

SUBMITTED: May 17, 1957.

1. Infrared spectra--Applications 2. Ammonia--Absorption
--Spectrographic analysis 3. Acetonitrile--Absorption--Spec-
trographic analysis 4. Aluminum silicate catalyst--Adsorptive
properties 5. Silica gel--Adsorptive properties

Card 4/4

SOV/30-58-11- 11/48

5(4)

AUTHOR:

Terenin, A. N., Academician

TITLE:

The Anniversary Meeting of the French Society for Physical Chemistry (Na godichnom yubileyenom sobranii **Frantsuzskogo** obshchestva fizicheskoy khimii)

PERIODICAL:

Vestnik Akademii nauk SSSR, 1958, Nr 11, pp 62 - 66 (USSR)

ABSTRACT:

The annual meeting was held from May 27 to 30, 1958 and was devoted to the physical problems of transmitting luminous energy and photo-sensitization. Because of the work of the Soviet scientists I.V.Obreimov, A.S. Davydov, A.F.Prikhot'ko it was found that the absorption and emission spectra of crystals consisting of molecules of organic compounds are produced by the crystal as a whole and not by individual molecules. The author of the present article and Ye.K.Putseyko obtained data on the sensitization of the electric conductivity of a number of semi-conductors by numerous dyes and reported to the meeting on their findings. The author also had drawn up a report in

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The Anniversary Meeting of the French Society for
Physical Chemistry

SOV/30-58-11-11/48

collaboration with V.L.Yermolayev on the recent results of research work in connection with the effect detected by them in 1952, the so-called "sensitized phosphorescence". Finally the author stated that the participation in the annual meeting had made it possible for him to establish personal contacts with foreign colleagues whose names he had known for decades. In a solemn meeting devoted to the fiftieth anniversary of the society, the author submitted to the Board of the Society a Welcome Address of the AS USSR.

Card 2/2

AUTHORS: Terenin, A. N., Filimonov, V. N.,
~~Byetrov, D. S.~~

SOV/48-22-9-23/40

TITLE: Infrared Absorption Spectra of Molecular Compounds of Metal
Halides (Infrakrasnyye spektry pogloshcheniya molekulyar-
nykh soyedineniy s galogenidami metallovo)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958,
Vol 22 , Nr 9, pp 1100 - 1102 (USSR)

ABSTRACT: This is an investigation of the infrared absorption spectra
of the molecular compounds of NO, acetonitrile, pyridine,
acetaldehyde, acetone, chloro acetyl ethyl acetate, di-
ethyl ether, methanol and cyclohexane with $AlBr_3$, $AlCl_3$,
 $SnCl_4$ and some other metal halides. The majority of
these molecular compounds was investigated in solid state.
They were produced by the sorption of the vapors of
organic compounds and of the gaseous NO which was
sublimated through the halide layer. A description of
the experimental method and part of the results were
published already in reference 1. A somewhat more pronounced

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Infrared Absorption Spectra of Molecular Compounds
of Metal Halides

SOV/48-22-9-23/40

shift of the frequency indicates that these metal halides possess better electron acceptor properties than protonic acids. The modifications in the infrared spectrum clearly indicate that the addition of metal halides to organic molecules can lead to the same modifications in these molecules as can the addition of a proton. This means that the halides of Al, Sn, Ti and Fe behave as strong acids even in the absence of the respective hydrogen halides. There are 7 references,¹ of which is Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gos.universiteta im.A.A.Zhdanova (Scientific Research Institute of Physics of the Leningrad State University imeni A.A.Zhdanov)

Card 2/2

SOV/48-22-11-18/33

24(0)
AUTHOR:

Terenin, A. N.

TITLE:

Inaugural Address (Vstupitel'noye slovo)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958,
Vol.22, Nr 11, pp 1366 - 1366 (USSR)

ABSTRACT:

In his inaugural address to the VI. Conference on Luminescence, the speaker said (i.e.): The first and second conferences have taken place in Moscow under the chairmanship of S. I. Vavilov in 1944 and 1948. The third conference, which was also convened in Moscow, was dedicated to his memory. A great number of questions was treated in the course of these three conferences. In view of the continually increasing scope of luminescence research, the Komissiya po luminestsentsii AN SSSR (Commission for Luminescence of the AS USSR) has decided to set up a classification of the conferences according to the subjects treated, wherein conferences on molecular luminescence should alternate with conferences on crystal luminophores. Consequently, the fourth conference at Minsk in 1955 was devoted solely to molecular luminescence, and the fifth conference at Tartu in 1956 to crystal luminophores and related problems of

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Inaugural Address

SOV/48-22-11-18/33

semiconductor physics. The sixth conference, which was held for the first time at Leningrad, has confined its agenda to the problems of molecular luminescence and luminescence analysis. This latter field has recently developed to a considerable extent, especially in biology and medicine (and also in other fields of science).

The number of lectures submitted for the sixth conference attained a record of 117, in spite of the fact that the conference on spectroscopy in 1957 had also included lectures on luminescence in its agenda. This gives evidence of the great progress of research in this field in the USSR. After honoring the late scientist S. I. Vavilov, the speaker declared the Sixth Conference on Luminescence as opened by order of the Organisation Committee.

This Conference took place in Leningrad on February 17-23, 1958 and was organized by the Fizicheskiy institut AN SSSR (Physical Institute of the AS USSR), the Gosudarstvennyy opticheskiy institut imeni S. I. Vavilova (State Institute of Optics imeni S. I. Vavilov) and the Akademiya nauk Belorusskoy SSR (AS Belorussian SSR).

Card 2/2

SOV/20-122-1-25/44

5(4)
AUTHORS: Vilesov, F. I., Kurbatov, B. L., Terenin, A. N., Academician

TITLE: A Mass-Spectrometric Investigation of the Photoionization and of the Photodissociation of the Vapors of Amines
(Mass-spektrometricheskoye issledovaniye fotoionizatsii i fotodissotsiatsii parov aminov)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 1, pp 94-96 (USSR)

ABSTRACT: For a detailed investigation of these processes, the authors prepared a mass spectrometer of the 90 degree type, the radius of the central ion trajectory of which was 126 mm. The following gaseous amines were investigated: ammonia NH_3 , hydrazine $\text{NH}_2\text{-NH}_2$, benzylamine $\text{C}_6\text{H}_5\text{-CH}_2\text{-NH}_2$, aniline $\text{C}_6\text{H}_5\text{-NH}_2$. The mass spectra found by irradiation of these compounds are given in a diagram. Only an elementary photoionization of the molecules according to the scheme $\text{AB} + h\nu \rightarrow \text{AB}^+ + e$ was observed. This result confirms the following assumption, expressed in one of the authors' previous papers. The photoionization current is caused only by the

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SOV/20-122-1-25/44

A Mass-Spectrometric Investigation of the Photoionization and of the Photo-dissociation of the Vapors of Amines

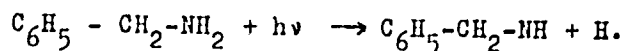
elementary photoionization of the molecules and the ioniza-
tion processes with a decomposition of the type

$AB + h\nu \rightarrow A^+ + B^-$ or $AB + h\nu \rightarrow A^+ + B + e$ are not probable
(less than 1 % of the main process). If vapors of aniline
and benzylamine are irradiated by electrons of $\sim 11,5$ eV,
more complicated mass spectra are observed; they are caused
by the decay of the molecules into ions. Therefore the appli-
cation of a photon beam (even if it is not monochromatic) is
more advantageous for the mass-spectrometric analyses of
complicated organic compounds and their mixtures than the
application of an electron beam. The use of monochromatic
light permits an additional analysis with respect to the
thresholds of the photoionization and the identification of
various isomers. Carrying out of the measurements is dis-
cussed. The spectra for the vapors of ammonia, hydrazine,
aniline and benzylamine are given in a diagram and are dis-
cussed in short. These spectra are arguments in favor of the
following processes: $NH_3 + h\nu \rightarrow NH_2 + H$, $NH_3 + h\nu_B \rightarrow NH_2 +$
 $+ H \rightarrow NH_2 + H + h\nu_{\phi}$, $NH_2 - NH_2 + h\nu_B \rightarrow NH_2 + NH_2 \rightarrow NH_2 + NH_2 + h\nu_{\phi}$,

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SOV/20-122-1-25/44

A Mass-Spectrometric Investigation of the Photoionization and of the Photo-dissociation of the Vapors of Amines



$\text{C}_6\text{H}_5 - \text{CH}_2 - \text{NH}_2 + h\nu \rightarrow \text{C}_6\text{H}_5 - \text{CH}_2 + \text{NH}_2$. The meaning of ν_B and ν_ϕ was, apparently, given in a previous paper. No photo-dissociation of aniline vapors into any kind of radicals was observed. There are 3 figures and 3 references, all of which are Soviet.

ASSOCIATION: Fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A. A. Zhdanova (Physics Institute of Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: May 30, 1958

Card 3/3

TERENIN, A. and ROYEV, L.

"Infrared Spectra of NO Molecules Adsorbed on Ni, Fe, Cr and their Oxides."

report submitted at the 4th International Meeting of Molecular Spectroscopy, Bologna, Italy, 7-12 Sept 1959.

Physical Institute of the University, Leningrad.

TEREMIN, A. N.

"Energy Transfer in Systems of Coupled Organic Molecules".

paper to be submitted for The Faraday Society, General Discussion on Energy Transfer with Special Reference to Biological Systems, Nottingham, England, 14-16 Apr 1959. (to take place in Nottingham University)

Prof., University of Leningrad

TERENIN, A. N. (Leningrad)

"Energy and Electron Transfer between Complex Molecules."

~~"Energy and~~

report submitted but not presented at the 4th International Meeting of Molecular Spectroscopy, Bologna, Italy, 7-12 Sept 1959.

KRAVETS, Torichen Pavlovich [deceased]; SMIRNOV, V.I., akademik; red.;
TERENIN, A.N., akademik, red.; GOROKHOVSKIY, Yu.N., red.;
NEPOMNI, B.S., red.; SAVOST'YANOVA, M.V., red.; TOPORETS, A.S.,
red.; FAYERMAN, G.P., red.; SAZONOV, L.S., red.isd-va; ZEMEL',
M.Ye., tekhn.red.

[Works in physics] Trudy po fizike. Moskva, Izd-vo Akad.nauk
SSSR, 1959. 339 p. (MIRA 12:11)

1. Chlen-korrespondent AN SSSR (for Kravets).
(Physics)

SOV/54-59-3-6/21

5(3)

AUTHORS:

Dodonova, N. Ya., Sidorova, A. I., Terenin, A. N.

TITLE:

Photosynthesis Under the Action of Schumann Radiation

PERIODICAL:

Vestnik Leningradskogo universiteta. Seriya fiziki i khimii, 1959, Nr 3, pp 33-38 (USSR)

ABSTRACT:

Already 20 years ago the photochemical decomposition of simple gases such as NH_2 , H_2O , CH_4 , CO , which were also present in the primary atmosphere of the Earth could be observed due to the short-wave ultraviolet radiation by Terenin (Ref 4) and others (Ref 5). The absorption spectra of these gases are in the Schumann range of the wavelengths. The limiting wavelengths of the photochemical decomposition of the afore-mentioned gases, the decomposition products and the final products are given in the table. Some of the forming radicals are luminescent. Besides the reactions mentioned, more complicated reactions take place such as the formation of formaldehyde and, finally, formamide (Ref 12). The formation of amino acids from somewhat more complicated compounds could be observed by various authors (Ref 13), Pavlovskaya and Pasynskiy (Ref 14). Groth (Ref 16)

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Photosynthesis Under the Action of Schumann Radiation SOV/54-59-3-6/21

recently reported on the photosynthesis of amino acids from natural gases. The authors of the present paper had made experiments for the photosynthesis of amino acids from natural gases already before the publication of the mentioned paper. For this purpose they used a hydrogen tube (Fig 1) with an energy distribution in the spectrum similar to that of sunlight. The apparatus is briefly described. A high-quality quartz window was used at the point of emergence of the beams. The transparency of this window was measured by F. I. Vilesov (Fig 2). The production of the gases is briefly described. Two experimental series were made: (1) with steam, methane, and ammonia, (2) the same with subsequent addition of carbon. Gas pressure was 100 torr, methane pressure, 500 torr. The mixture was irradiated for 24-26 hours. At the bottom of the reaction cell some liquid drops accumulated which were investigated by paper chromatography. Figure 3 shows schematically the typical chromatograms. The following amino acids could be definitely determined herefrom: α -alanine, α -aminobutyric acid, valine, and nor-leucine. In experiments only with steam and ammonia no amino acids could be found. Furthermore, some problems of photochemical synthesis were discussed, and

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Photosynthesis Under the Action of Schumann Radiation SOV/54-59-3-6/21

Terenin, K. Ya. Kasparov (Ref 17), Terenin and Yu. P. Solonitsyn (Ref 19) are mentioned in this connection. There are 3 figures, 1 table, and 20 references, 5 of which are Soviet.

SUBMITTED: April 15, 1959

Card 3/3

5.3310

5.2600

67154

SOV/51-7-6-8/38

AUTHORS: Royev, L.M. and Terenin, A.N.TITLE: Infrared Spectra¹ of Nitrogen Oxide Adsorbed on Transition Metals, on
Their Salts and Oxides

PERIODICAL: Optika i spektroskopiya, 1959, Vol 7, No 6, pp 756-762 (USSR)

ABSTRACT: Adsorption of nitrogen oxide on transition metals, their salts and oxides was studied using their infrared absorption spectra. Nitrogen oxide was used because of the variety of ways in which it can interact with the adsorbent. It can easily lose one electron becoming thus a nitrosonium ion (NO^+), it accepts easily one electron forming NO^- or, in its neutral state, it can form a covalent bond. Transition metals (Fe, Ni, Cr) were used in disperse state. Because of their low transparency each of these metals was deposited on the surface of a suitable carrier such as alumina gel (which has high specific surface area of $300 \text{ m}^2/\text{g}$ and is transparent in a wide range of infrared frequencies). Carbonyl of the appropriate metal was adsorbed on alumina gel and subsequently thermally reduced to metal (at $\sim 150^\circ \text{C}$). Transition-metal salts were also deposited on alumina gel by immersing the latter in the appropriate salt solution for 5-10 hours, with subsequent drying at $\sim 100^\circ \text{C}$. Iron and chromium oxides were produced in gel-like form with specific surface area of $\sim 100 \text{ m}^2/\text{g}$. Nickel oxide, freshly prepared

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301/51-7-E-8/38

Infrared Spectra of Nitrogen Oxide Adsorbed on Transition Metals, on Their Salts, and Oxides

by thermal decomposition of $\text{Ni}(\text{NO}_3)_2$, also had sufficiently large specific surface area. All these samples were deposited on fluorite plates. Measurements were made in the region $1000-2300 \text{ cm}^{-1}$ using an IKS-11 spectrometer with an NaCl prism. Before measurements samples were kept at $\sim 150^\circ\text{C}$ for several hours in $5 \times 10^{-5} \text{ mm Hg}$ vacuum. Then the samples were cooled, their spectra (without NO) were recorded, NO was adsorbed at $\sim 20^\circ\text{C}$ and 20 mm Hg or other pressures, and the spectra were again recorded. Some of the results obtained are given in Figs 1-6. The infrared absorption spectrum of NO adsorbed on iron is shown in Fig 1; the spectra of NO adsorbed on nickel (curve 1) and chromium (curve 2) are given in Fig 2. The spectrum of NO adsorbed on iron oxide gel is shown in Fig 3 and the effect of oxygen on the latter spectrum is illustrated in Fig 4. The spectra of gaseous NO and of NO adsorbed on SiO_2 , Al_2O_3 , NiO , Fe_2O_3 and Cr_2O_3 are shown schematically in Fig 5. The spectra of NO adsorbed on Ni^{++} , Co^{++} , Fe^{++} , Mn^{++} and Cr^{+++} salts are given in schematic form in Fig 6; the d-shell configuration of the appropriate metal ion is shown on the right of Fig 6. These results show that gaseous nitrogen oxide has an absorption band at 1876 cm^{-1} . On formation of nitrosonium ions (NO^+) the frequency of this band is displaced towards

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67154

SOV/51-7-6-8/38

Infrared Spectra of Nitrogen Oxide Adsorbed on Transition Metals, on Their Salts and Oxides

shorter wavelengths. Such a displacement indicates one of the following types of binding between NO and the adsorbent surface:

1) $Me-NO^+$ (ionic binding),

2) $Me-\dots\begin{array}{c} N \\ || \\ O^+ \end{array}$ or $Me-N\equiv O^+$.

Formation of a covalent bond between NO and the surface may mean one of the following types of binding:

1) $Me-N=O$, 2) $Me-N^+=O$, 3) $Me:NO$.

In this case the frequencies lie between 1870 and 1700 cm^{-1} . When NO^- ions are formed the vibrational frequency is displaced into the region from 1000 to 1100 cm^{-1} ; no absorption bands were observed in this region. The above information was used to interpret the results obtained on transition metals, their salts and oxides. It was found that adsorption of NO on iron involves the following types of binding:

$Me-NO^+$ or $Me-\dots\begin{array}{c} N \\ || \\ O^+ \end{array}$.

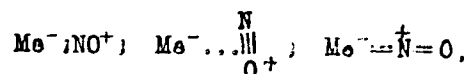
Card 3/4

In the case of nickel adsorbed NO forms covalent bonds, while in the

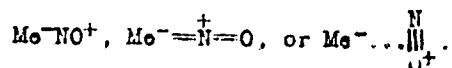
67154

Infrared Spectra of Nitrogen Oxide Adsorbed on Transition Metals, on Their Salts and Oxides SOV/51-7-8-8/38

case of chromium binding may have one of the following forms:



or covalent bonds $\text{Me--N}\equiv\text{O}$ may be formed. NO is adsorbed on oxides at adsorption centres which include oxygen and metal ions. The latter may form covalent or donor bonds with NO molecules. The nature of the spectra of NO adsorbed on salts is governed primarily by the circumstance whether the number of d-electrons of the metal ion is even or odd. If the number of these electrons is even a covalent bond $\text{Me}\text{:NO}$ is formed. If this number is odd then one of the following types of binding may occur:



There are 6 figures and 10 references, 2 of which are Soviet and 8 English.

SUBMITTED: June 18, 1959.

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4

DODONOVA, N.Ya.; SIDOROVA, A.I.; TERENIN, A.N.

Photosynthesis under the action of Schumann radiation. Vest. LGU
14 no.16:33-38 '59. (MIRA 12:10)
(Photosynthesis) (Ultraviolet rays)

5(4), 24(7)

SOV/20-124-2-37/71

AUTHORS:

Royev, L. M., Terenin, A. N., Academician

TITLE:

The Infrared Spectra of Water, Ethanol, and Methanol Adsorbed on Chromic Oxide (Infrakrasnyye spektry vody, etanola i metanola, adsorbirovannykh na okisi khroma)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 2, pp 373-376 (USSR)

ABSTRACT:

The authors endeavor to find the mechanism of the decomposition of alcohols on Cr_2O_3 . The oxides of transition metals (above all Cr_2O_3 and Fe_2O_3) are of particular interest because on their surface the existence of several catalytically active centers may be assumed. The Cr_2O_3 -preparation was produced by annealing a thin layer of ammonium dichromate. This Cr_2O_3 is catalytically active in a decomposition of alcohols and had a large specific surface ($176 \text{ m}^2/\text{g}$). The Cr_2O_3 -powder was pressed between plates of NaCl. The heat treatment of the surface of the samples is described in short. The spectrum was recorded by

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The Infrared Spectra of Water, Ethanol, and Methanol Adsorbed on Chromic Oxide

means of a spectrometer IKS-11 with an NaCl-prism, and the spectral curves of the transmitted radiation are given by a diagram. The spectral range of $800 - 1700 \text{ cm}^{-1}$ was investigated. H_2O was investigated at 20° at a steam pressure of 4 mm. A diagram shows the spectrum of Cr_2O_3 after adsorption. Within the range of $800 - 1700 \text{ cm}^{-1}$ the following absorption bands occur: 1645; 1492; 1336; 1180; 1042; 936; 850 cm^{-1} . Besides these bands with sharply marked maxima there is a common background within the entire investigated range of $800 - 1700 \text{ cm}^{-1}$. The broad and intense absorption band at 1645 cm^{-1} belongs to the capillarily condensed phase of water. The bands 1492, 1336 and 1180 cm^{-1} are apparently caused by the H_2O molecules adsorbed on Cr_2O_3 . The bands 1042, 936 and 850 cm^{-1} are to be ascribed to the OH-groups, which are connected with the sur-

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SOV/20-124-2-37/71

The Infrared Spectra of Water, Ethanol, and Methanol Adsorbed on Chromic Oxide

face-structure of Cr_2O_3 . The existence of many bands in the adsorption of H_2O indicates the existence of several types of adsorption centers on the surface of the Cr_2O_3 . The ethanol vapors were adsorbed at a pressure of 40 mm at the temperatures of 20 and 150° on Cr_2O_3 . The bands 1645, 1336, 942, and 859 agree tolerably well with the bands found in the adsorption of H_2O on Cr_2O_3 . The creation mechanism of individual bands is described in short. In a similar manner the adsorption of methanol is described. Interpretation of the spectra permits the following conclusions to be drawn: Already at 20° the adsorption of alcohols on Cr_2O_3 is accompanied by the following processes: a) splitting-off of H_2O molecules and OH-groups from the molecules of alcohol and formation of an unsaturated compound. b) splitting-off of hydrogen and formation on the surface of compounds of the type $\text{Cr} - \text{O} - \overset{\textstyle |}{\underset{\textstyle |}{\text{C}}} -$ (in the case of

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The Infrared Spectra of Water, Ethanol, and Methanol Adsorbed on Chromic Oxide

methanol) and $\text{Cr} - \text{O} - \overset{\textstyle |}{\underset{\textstyle |}{\text{C}}} - \overset{\textstyle |}{\underset{\textstyle |}{\text{C}}} -$ (in the case of ethanol). There are 4 figures and 12 references, 7 of which are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova
(Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: October 6, 1958

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SOV/20-124-4-38/67

5(4), 24(7)

AUTHORS:

Kotov, Ye. I., Terenin, A. N., Academician

TITLE:

The Investigation of the Ultraviolet and Visible Absorption Spectra of Aromatic Amines Adsorbed on the Specific Centers of Aluminosilicates Catalysts (Issledovaniye ul'trafioletovykh i vidimyykh spektrov pogloshcheniya aromaticheskikh aminov, adsorbirovannykh na spetsificheskikh tsentrakh alyumosilikatnykh katalizatorov)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 124, Nr 4, pp 865-868 (USSR)

ABSTRACT:

An investigation of the above-mentioned spectra is of interest for the purpose of explaining the influence exercised by proton-donor- and electron-acceptor-centers on the activity of aluminum silicate catalysts in cracking. M. A. Kaliko (VNI NP) and K. V. Topchiyeva (MGU) kindly placed technical and laboratory samples of synthetic aluminum silicate catalysts of various composition at the authors' disposal. The authors further had samples of an aluminum silicate catalyst available, which was produced by I. P. Moskovskaya (MGU) in solutions of NaOOCCH_3 and LiOOCCH_3 and was etched with Na^+ - and Li^+ -ions. For spectral investigation the aromatic amines used already previously in the authors' laboratory were used: also the adsorbents used

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SOV/20-124-4-38/67

The Investigation of the Ultraviolet and Visible Absorption Spectra of
Aromatic Amines Adsorbed on the Specific Centers of Aluminosilicate Catalysts

(there were 13 of them) are mentioned. All adsorbents were crushed in a mortar and scattered through a gauging-net. The powder thus obtained consisted of particles of irregular shape and measuring about 50μ . The specific area of the powder probably amounts to $300-500 \text{ m}^2/\text{g}$. The pre-treatment of the adsorbents is described in short. The adsorption spectra of aniline are given by a diagram. A further diagram schematically shows the absorption bands found in the case of the adsorption of aniline in various adsorbents. The third diagram shows the absorption spectra of the positive molecular ions of the dimethyl para-phenylene diamine, which are located in the visible region. All data found by the present paper are indicative of the existence of strong electron-acceptor oxidation centers on the surface of the aluminum silicate catalysts. The following conclusions are arrived at: 1) In the etching of aluminum-silicate catalysts by Na^+ - and Li^+ -ions the oxidizing electron-acceptor centers are conserved, and they also remain accessible to the adsorbed foreign molecules. The activity loss of the catalysts indicates that the activity of the aluminum-silicate catalysts used for cracking cannot be directly connected with the existence

Card 2/3

SOV/20-124-4-38/67

The Investigation of the Ultraviolet and Visible Absorption Spectra of
Aromatic Amines Adsorbed on the Specific Centers of Aluminosilicate Catalysts

of these centers. 2) With the disappearance of the activity of the aluminum-silicate catalysts used for cracking when etched by ions of alkali metals, also the proton-donor centers disappear, which become noticeable by their influence on the adsorbed molecules. The authors thank K. V. Topchiyeva, I. F. Moskovskaya, and M. A. Kaliko for their collaboration in connection with investigations, and for their advice. There are 3 figures and 9 references, 7 of which are Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy fizicheskiy institut Leningradskogo gosudarstvennogo universiteta im. A. A. Zhdanova
(Physico-scientific Research Institute of Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: November 3, 1958

Card 3/3

2. (7)
AUTHORS:

Royev, L. M., Terenin, A. M.,
Academician

SOV/20-125- -3

TITLE:

The Infrared Spectra of Nitrogen Acid in the State of
Adsorption on the Oxides of Iron and Chrome (Infektsionnye
spektry okisi azota v sostoyanii adsorotsii na okislyakh zheleza i
khroma)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 3,
pp 549-550 (USSR)

ABSTRACT:

In the present paper the authors investigated the infrared
adsorption spectra of NO on oxides of iron and chrome in order
to detect the presence of electron-acceptor - centers on their
surface. A spectral criterion (the variation of the frequency
of the infrared adsorption band of the NO-molecule) was used
for this purpose. The powdered adsorbents were applied to a
plate of CaF_2 . Also the further treatment of the samples and
the preparation of NO are discussed. The adsorption of NO on
 Fe_2O_3 . The gases were adsorbed at 200 and 150°, and the authors
found no differences in the spectra. The first diagram shows


Card ~~X~~

The Infrared Spectra of Nitrogen Acid in the
State of Adsorption on the Oxides of Iron and Chromium

SOV/20-125-3-34/13

the infrared spectrum of NO-molecules adsorbed on ferrigel. At the used pressure of 30 mm and at the used thickness of the vessel, a spectrum of gaseous NO is not visible. An increase of the contact time of the gas exerts no influence upon the number of bands, but increases the intensity of the bands 1865, 1806, and 1770 cm^{-1} . Further details are discussed in short.

The bands 1865 and 1770 cm^{-1} can be ascribed to liquid NO in which also the dimers N_2O_2 are visible. The second diagram shows the changes of the spectra of adsorbed NO-molecules which are caused by the introduction of oxygen. The bands 1700, 1665, and 1625 cm^{-1} of strongly chemisorbed NO-molecules evidently can be ascribed to the formation of a covalent bond with the oxygen atoms of the adsorbent. The bands 1806 and 1738 cm^{-1} (which are shifted toward the long-wave range with respect to the gas) have to be ascribed to the NO-molecules which entered a covalent or coordination bond with the iron atoms on the surface. The authors then discuss the adsorption of NO on Cr_2O_3 . Some bands of this spectrum may be compared with the bands observed in the case of ferrigel.


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The Infrared Spectra of Nitrogen Acid in the
State of Adsorption on the Oxides of Iron and Chrome

SCV/20-125-1-34/1

The individual bands are discussed in detail. No bands of adsorbed molecules could be detected in the range 1000-1200 cm^{-1} . Finally, the authors draw some conclusions: In the case of adsorption of NO on the oxides of iron and chrome, there are three kinds of adsorbed centers which are characterized by different amounts and directions of the infrared adsorption band with respect to the gas. In the centers of the first type, eventually, there is a covalent bond with the metal atoms. In the centers of the second type, however, donor bonds are formed and the state of the NO-molecule approaches the electron configuration of NO^+ . These centers obviously belong to the metal ions. The third type of adsorption centers is caused by oxygen atoms which form a strong covalent bond with NO. There are 3 figures and 7 references, 2 of which are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet im. A. A. Zhdanova
(Leningrad State University imeni A. A. Zhdanov)

Card 3/1 

307/20-125-5-26/61

24(3), 24(4), 5(4)
AUTHORS:

Vilesov, P. I., Terenin, A. M., Academician

TITLE:

The Variation of the Photoelectric Work Function of ZnO, NiO and Cr_2O_3 in the Adsorption of Gases and Vapors (Izmeneniye fotoelektricheskoy raboty vykhoda ZnO, NiO i Cr_2O_3 pri adsorbtsii gazov i parov)

PERIODICAL:

Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 5, pp 1053 - 1056 (USSR)

ABSTRACT:

The authors investigated the photoelectric emission from the surface of ZnO, NiO and Cr_2O_3 before and after the adsorption of several gases and vapors on them, in order to obtain new data concerning the electron-donor-acceptor interaction of molecules with the adsorbents (which are typical semiconductors). Investigation of the photoemission originating from oxide semiconductors meets with some difficulties which are essentially due to the high work function. It was therefore necessary to alter the apparatus formerly (Ref 3) used for this purpose. A vacuum monochromator warranted a monochromatic radiation in the distant ultraviolet spectral range. In the

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The Variation of the Photoelectric Work Function of
ZnO, NiO and C_2O_3 in the Adsorption of Gases and Vapors

SCV/20-125-5-28/61

first series of experiments the adsorbent was located immediately in a counter filled with argon to which the gas to be adsorbed was added. In the case of the second series of experiments the counter was separated from the vacuum cuvette by a vacuum-tight colloid film (thickness 0.1 to 0.2 μ). Measurement of the photoelectric work function from the surface of the zinc oxide in the case of the adsorption of oxygen on it yielded the following main results: For the zinc oxide samples saturated with oxygen, the threshold of photoelectric emission is 7.25 ev. By heating these samples for 20 minutes up to 300 to 350° (under a vacuum) followed by cooling to room temperature, the threshold shifts to 6.7 ev. After repeated heat treatment the threshold shifts further towards the long-wave side of the spectrum, after which it tends towards the limit (6.3 ± 0.1) ev at 1970 Å. Such a value of the photoelectric work function corresponds to a pure surface of zinc oxide and is determined by the position of the upper level of the filled-up zone. The considerable increase (by 1 ev) of the photoelectric work function from

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The Variation of the Photoelectric Work Function of
ZnO, NiO and Cr_2O_3 in the Adsorption of Gases and Vapors

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the zinc oxide surface in the course of the adsorption of oxygen indicates a negative charge of the surface layer. The dipole layer formed in this connection counteracts the emergence of electrons. A formula for the increase of the work function is written down. The level of the adsorbed ion O_2^- must be 0.2 to 1.2 eV below the bottom of the conductivity zone, which is also in agreement with the results obtained by other investigations carried out in the author's laboratory (Ref 9). These and other results obtained in the present case show that benzene and ethanol are adsorbed on the oxides of zinc and chromium (electron semiconductors) and on nickelous oxide (hole semiconductors) with a certain shifting of the negative charge towards the adsorption centers. The decrease of the work function does not depend on the nature of oxide conductivity and is determined by the nature of the adsorbed molecules and adsorption centers. There are 3 figures and 13 references, 10 of which are Soviet.

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The Variation of the Photoelectric Work Function of ZnO , NiO and Cr_2O_3 in the Adsorption of Gases and Vapors SOV/26-125-5-26/61

ASSOCIATION: Leningradskiy gosudarstvenny universitet im. A. A. Zhdanova
(Leningrad State University imeni A. A. Zhdanov)

SUBMITTED: January 28, 1959

Card 4/4

TERENIN, A.N.

Spectroscopy of elementary processes on the surface of oxide
catalysts. Probl. kin. i kat. 10:214-224 '60. (MIRA 14:5)
(Oxides) (Catalysts)

• TERENIN, A.N.

Transfer of energy and its importance in biological systems;
a discussion of the Faraday Society. Biofizika 5 no.1:107-
113 '60. (MIRA 13:6)
(FORCE AND ENERGY) (BIOPHYSICS)

9.4160 (3201, 2804, 1164, 1395)
24.2600 1141, 1138, 1136
24.7700 2209, 1043, 1151,

20613

S/063/60/005/005/002/021
A051/A029

AUTHOR: Terenin, A.N., Academician

TITLE: Organic Semiconductor Dyes and Their Photoelectric Properties

PERIODICAL: Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D.I.
Mendeleeva, 1960, No. 5, Vol. 5, pp. 498-506

TEXT: In view of the increasing interest in electroconductivity and photoelectric properties of organic compounds, the author discusses these new physical characteristics in relation to dyes and deals particularly with the problem of energy migration in biological systems. Organic dyes are regarded as the large intermediary class of organic semiconductors, which are crystals composed of complex organic molecules or molecular ions. The author gives a theoretical survey of the darkness conductivity noted in organic dyes. It is pointed out that together with the growth of the aromatic or heterocyclic chains and length of the conjugated system, the organic compound becomes colored, i.e., the magnitude of the quantum energy

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